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NATURE CONSERVATION IN INDONESIA

by John Blower

The Indonesian archipelago is the world's largest group of islands, said to number over 3000, and varying in size from small coral atolls to such large land masses as Borneo, Sumatra and W. Irian (the Indonesian half of New Guinea). Straddling the equator, they extend in a great arc for a distance of some 6000 km between longitudes 92° and 141° east, enclosed to the northward by the South China Sea and Pacific and southward by the Indian Ocean.

To the west, Sumatra, Borneo and Java lie on the Sunda shelf, and - even now only separated by shallow seas - were joined to the Asian mainland within the past 20,000 years. At the eastern end of the archipelago, Irian and the Aru Islands rest on the Sahul shelf, separated by the Arafura Sea from the Australian continent of which they were once a part.

Ecologically these two groups of continental islands reflect affinities with, respectively, mainland S.E. Asia and Australia, and are therefore divided zoogeographically between the Oriental and Australian Regions; Sumatra, Borneo and Java in the former, and Irian and Maluku in the latter. Sulawesi and the Lesser Sundas having remained physically isolated from the two continents are true oceanic islands, and have evolved a specialized flora and fauna with both Indo-Malayan and Australian elements and also an unusually high proportion of endemics. Lying to the east of Wallace's Line, they are placed zoogeographically-together with the Philippines - in the Wallacean Sub-Region of the Oriental Region.

Much of Indonesia is mountainous, with a long chain of ranges, in many places culminating in volcanic cones, running down the west side of Sumatra through Java to the Lesser Sundas. There are also extensive highland areas in Central Kalimantan, Sulawesi, and in West Irian where the Central

highlands form a great East-West watershed averaging 4000 m. above sea level and reaching over 5000 m. at the snow-capped peak of Puncak Jaya (formerly Gunung Cartenz), Indonesia's highest mountain.

There are also extensive lowlands in East Sumatra, in Kalimantan and in parts of West Irian.

Indonesia is one of the most richly forested countries in the world, with a wide range of forest types ranging from coastal mangroves, freshwater swamp forests and lowland rainforest to the savannah woodland and dry monsoon forest of Lesser Sundas; from the *Pinus merkusii* of Sumatra to the *Casuarina junghuniana* so characteristic of the Java volcanoes, and from oaks, chestnuts and *Agathis* to *Eucalyptus* and other typical Australian genera which begin to appear in the more easterly islands. According to official statistics some 1.2 million km^2 or approximately 63 per cent of the country is forest covered, though this includes extensive areas of secondary vegetation devastated by shifting cultivation of areas which have been intensively logged.

The vast extent of the country and wide spectrum of habitats is reflected by the diversity of this fauna, with such characteristically Asiatric elements as tiger, leopard and clouded leopard, elephant, rhinoceros (Javan and Sumatran), tapir, banteng and sambar of the western islands contrasting with the typically Australian fauna of W. Irian with its marsupials and monotremes, including kangaroos, wallabies, phalangers and spiny anteaters. But apart from the separation of predominantly Asiatic and Australian fauna west and east of Wallace's Line, there are many interesting anomalies in distribution of individual species such, for example, as the occurrence of tiger in Sumatra, Java and Bali (where it is now probably extinct) but not in Kalimantan or any of the other islands; leopard *(Panthera pardus)* in Java but not in Sumatra or Kalimantan; tapir and elephant in Sumatra but not Kalimantan (there are a few elephant in Borneo though they are said to have been introduced), and Malayan sun-bear in both Sumatra and Kalimantan but not elsewhere.

Of special interest and importance are the relatively large number of endemic primates such as, for example, the orang utan – of which the two sub-species, *Pongo pygmaeus pygmaeus* and *P. pygmaeus abelii,* occur in, respectively, Kalimantan and Sumatra –, the proboscis monkey *Nasalis larvatus* of Kalimantan (which, along with *Pongo pygmaeus pygmaeus,* also occurs elsewhere in Borneo), the black Celebes macaques – of which at least four separate species have been distinguished – and a number of others, including no less than four primates endemic to the Mentawai Isalnds off the West coast of Sumatra (a gibbon, a leaf-monkey, a snub-nosed langur, and a pig-tailed macaque.

Among more unusual representatives of Indonesia's endemic fauna are the Komodo dragon, *Varanus komodoensis,* the world's largest lizard, confined to the west coast of Flores and three neighbouring off-shore islands; the dwarf buffalo or anoa of Sulawesi (2 species), and the babirusa, a very remarkable pig in which the tusks of the male protrude through the top of the upper jaw, curving back towards the eyes. There are innumerable other mammals, birds, reptiles, insects and other creatures endemic to the forests of Indonesia, and, of course, also very many plants.

But despite the remarkable diversity of Indonesia's wildlife, both numbers and range of most species

Wallaby

Komodo dragon

are being steadily depleted through loss of habitat, hunting and other causes and a substantial number are listed in the IUCN Red Data Books as threatened. Prominent among the twenty mammals so listed are orang utan, tiger, leopard, clouded leopard, Asiatic wild dog, elephant, Sumatran and Javan rhinoceros, tapir, banteng and dugong. Of these all are endangered and some such as the Javan tiger, orang utan, Sumatran elephant and the two rhinoceros seriously so. There have been no confirmed reports of Bali tiger for several years and they are now almost certainly extinct, while there are believed to be not more than 4-5 Javan tiger left in the Meru Betiri Reserve in East Java. The Sumatran sub-species, of which there are probably still several hundred, offers the only real hope for the future survival of tiger in Indonesia, and then only if Reserves can be established with sufficient areas of suitable habitat and effective protection against hunting.

There are still viable populations of orang utan in both northern Sumatra and Kalimantan, but they are dependent on primary forest habitat with a relatively continuous canopy, and are coming under increasing pressure as more and more of the remaining lowland forest is logged. It is unlikely that elephant now number more than one or two hundred in all of Sumatra, scattered in small groups, isolated in remaining islands of forest and no longer able to complete their long seasonal migrations. Though less dependent on primary forest, they too need sufficiently large areas where they can wander freely and are safe from hunting and other forms of harrassment. Of special interest and importance are the two species of rhinoceros, the two-horned Sumatran, *Dicerorhinus sumatrensis,* and the one-horned Javan, *Rhinoceros sondaicus.* Both are now very rare and both are dependent for their survival on a single Reserve; the former on the 8000 km^2 Gunung Leuser Reserve in North Sumatra, where there are believed to be about a hundred (there are also a few small relict populations elsewhere in S.E. Asia), while the Javan, of which there are probably not more than fifty, is confined to the relatively small (300 km^2) Ujung Kulon peninsula in West Java, now proposed as part of a future national park.

From these few examples it will be seen that while Indonesia has one of the richest and most varied faunas in the World, many of the larger and more spectacular species are so reduced in number that without effective protection they could follow the Bali and Java tigers into extinction within a few years. Other species and the ecosystems of which they form a part, ranging from Birds of Paradise to Dugongs and from coral reefs to lowland rainforest, are increasingly threatened and call for urgent conservation measures before it is too late.

Conservation is the responsibility of the Directorate of Nature Conservation, which is a part of the Directorate-General of Forestry. There are at present some 160 Reserves totalling about 3.8 million hectares, equivalent to just under 2% of the land area. They range in size from as little as one hectare to 8,000 km^2 in the case of Gunung Leuser in North Sumatra (actually a complex of several adjoining Reserves). There are as yet no National Parks in Indonesia, though eight have now been proposed, including Gn. Leuser, Ujung Kulon, Baluran, Bromo Tengger, Komodo and Lore Kalamanta (Central

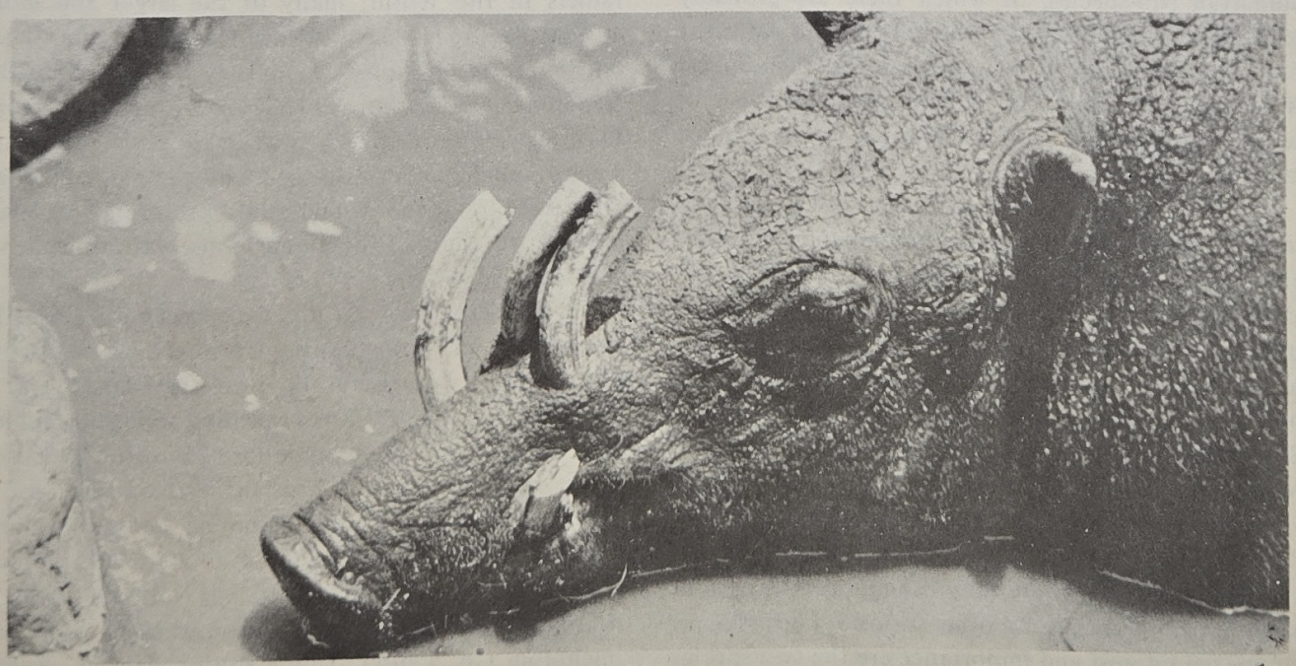
Sulawesi). All these areas are potentially fine Parks which could play a valuable role both in conservation of Indonesia's natural heritage and also in development of the economically important tourist industry. Their legal establishment must, however, await introduction of the new legislation now in course of preparation since the existing law makes no provision for National Parks.

The present conservation areas consist of Nature Reserves which are fully protected by law and Game Reserves wherein wildlife is protected but the habitat can be "managed". Nature Reserves comprise less than half the total, which means that fully protected areas amount to less than one per cent of the land area. Unfortunately "management" in several large and important Reserves has taken the form of timber exploitation, with the result that forest ecosystems have suffered serious damage and habitat for orang utan and other species dependent on closed canopy primary forest has been much reduced.

Apart from the inevitable conflict of interests between conservation and commercial timber exploitation, other major problems include encroachment by shifting cultivators, poaching, and the extensive export trade in wildlife, especially birds from W. Irian and Maluku. The Directorate of Nature Conservation is severely handicapped by lack of trained and experienced staff at all levels and also by the present inadequate legislation. But the situation is gradually improving and conservation is being given high priority under the Third Five-Year Development Plan, with a considerably increased budget allocation (approx US $ 2 million for 1978/79) and a projected three-fold increase in the total area of Reserves to 10 million hectares. Particularly encouraging is the recent policy decision that nature conservation shall be the first priority in forestry planning for the immediate future, and that the objective will be conservation of total ecosystems rather than of individual species in isolation, as has tended to be the case in the past.

Technical assistance in conservation planning is being provided by a small-scale FAO project which, since it started in 1974, has been chiefly engaged in field surveys, together with Directorate of Nature Conservation personnel, and in preparation of management plans. Substantial support is also being provided by the World Wildlife Fund which now has a US $ 1 million programme including research, surveys, provision of equipment and other assistance. Greatest promise for the future, however, lies in the central Nature Conservation Training School shortly to be established near Bogor under the Netherlands Government aid programme. This will provide much needed training for supervisory field staff (Warden and Assistant Warden level) and others, and it is hoped it may eventually also be able to accept students from other neighbouring countries.

Especially encouraging is the increasing concern of University students and other educated Indonesians for such problems as pollution and the dangers of over-exploitation of natural resources. The growing appreciation of the recreational value of natural areas is demonstrated too by the thousands of city dwellers who at weekends and holidays flock to Cibodas, Pangandaran and other well-known Reserves in Java. Whilst there are still many problems for conservation in Indonesia, these changes in public attitude, and particularly the high priority now being given by Government itself to environmental matters, offer real hope for the future.



Babirusa

OBSERVATIONS ON SOME LARGE MAMMALS OF THE TRANSALTAI, DJUNGARIAN AND SHARGIN GOBI, MONGOLIA

by Y. Dash (1), A. Szaniawski (2), G.S. Child (3), P. Hunkeler(4)

Over the past 20 years, several expeditions have been organized to the Gobi region (Bannikov, 1954). A detailed bibliography is included in Dobchin, 1970. Another, up to 1969, and a list of animal sightings, particularly of *Equus przewalskii* and *Camelus bactrianus,* have been published by Tsevegmid and Dashdorj (1974).

During 1972, Dash visited the region and prepared a preliminary report for the Government on the possibility and desirability of establishing protected areas in the Gobi region. Dash again visited the area in 1974, together with Szaniawski and scientists from the USSR. A note on this expedition was published by Bannikov (1975/1976). In 1974 and 1975, Szaniawski took part in two further expeditions; during the former he was accompanied by Dash and on the latter by Buindelger, another Wildlife Officer of the Department of Wildlife Management. Observations made during these four expeditions are included in the present article.

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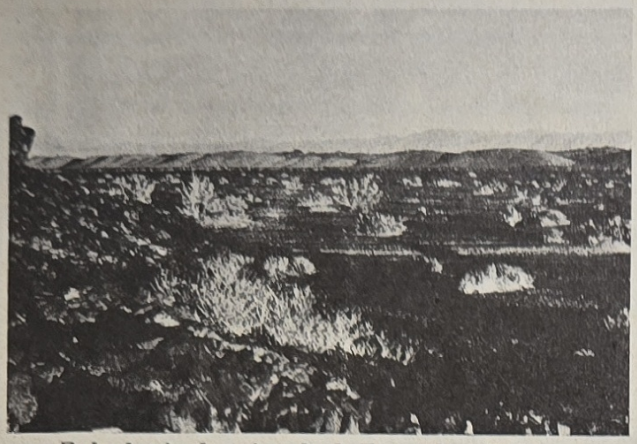
In the latter part of May and the beginning of June 1976, the four authors took part in a two week expedition to the Gobi region organized in connection with the visit of an international mission which was sent to Mongolia at the invitation of Government to discuss plans for the establishment of protected areas in the region and to assist in the preparation of a programme of action to implement the proposals.

The purpose of this paper is to communicate the efforts being made by the Mongolian authorities to protect the fauna and flora of the Gobi region and to record significant observations made recently in the area. It is not intended to discuss findings in detail, nor to compare them with other published work. Our reason for this is that it is anticipated that, in association with the establishment and management of protected areas in the Gobi, a programme of scientific research will be initiated, with international assistance, and that this will result in the gathering of more comprehensive information on the fauna of the area than the scattered observations made during the relatively short expeditions organized hitherto.

Description of area

The Gobi region under consideration lies in the south –western part of the Mongolian People's Republic, adjacent to its international boundary with the People's Republic of China.

The elevation of most of the area is above 1,000 m and consists of undulating plains which are broken by ridges and mountain ranges. The highest peaks of the latter approach 3,000 m altitude. Mean annual preci-



Ephedra in dry river bed, Transaltai Gobi

pitation for the more northerly parts of the area lie between 100 mm and 200 mm, but the major part of it receives under 100 mm per year. Another important factor is that there is considerable variation, both spatial and temporal, in the distribution of precipitation over the region and of course a significant proportion of it occurs as snow.

Mean annual temperatures range from a maximum of the order of 25°C to a minimum of – 15°C, with the absolute maxima and minima exceeding these figures considerably. In common with many desert areas, the Gobi experiences strong winds at times.

Large tracts of the area are rocky or strewn with stones which are often strikingly coloured and polished by wind-blown sand. Alkali flats are encountered in some localities, but there are surprisingly few sand dune areas and those that occur are of limited extent. There are extensive areas which are almost devoid of vegetation. The most widely distributed plant of the region is the Saksaul bush, *Haloxylon ammodendron.* It is the dominant plant over vast areas of the plains and extends into broken country. Along dry water courses (Mongolian = Sayor), which have experienced a flash flood within the previous ten years or so, vigorous stands of bushes of *Tamarix spp.* occur, whilst in mountain canyons and valleys *Ephedra przewalskii* often characterises the vegetation. This latter plant is also commonly associated with saksaul. In several localities, particularly on the lower slopes and wide valleys of rolling hills, wild onion, *Allium spp.*, are abundant. These are frequently associated with grasses to form extensive areas of short green pasture.

Stands of a poplar tree, *Populus diversifolia,* are found at many of the oases and at the larger ones, a willow, *Salix ledebouriana,* occurs. Conspicuous yellow-stemmed bushes of *Caragana spp.* are common in many localities and these, together with other legumes, such as *Amniopipthanthus mongolicus,* appear to be much sought after as browse species by the larger ungulates of the region.

A successful coloniser of the sand dune areas is the spiny *Nitraria sphaerocarpa,* which, in addition to contributing to the stabilization of dunes, is also a palatable species.

Observations on large mammals

Panthera uncia, Schreber, 1778, Snow Leopard

During the 1976 expedition tracks were seen at Shar Khulsny Khafsal. Four specimens were encountered in caves on the western slopes of the Atas mountains at Myltsin Nourou in 1975. These consisted of a female and three cubs. Although in most situations in Mongolia snow leopard occurs in mountains supporting populations of ibex, in this case no signs of ibex were found, though wild ass spoor was plentiful in the vicinity. Around the caves the remains of wild ass, Tolai hare *(Lepus tolai)* and Rock partridge *(Alectoris graeca)* were found.

In 1974 snow leopard tracks were seen at Segs Tsagan Bogd, Edergiin Nourou and on the Sheviet Ula ridges.

Canis lupus, Linneaus, 1758, Wolf

Tracks and droppings have been seen near practically all waterpoints in the Transaltai Gobi. During the 1976 expedition, one wolf was sighted at Shar Khuls oasis and a pair was seen at Takhilgiin Us oasis.

Ursus pruinosus, Blyth, 1854, Gobi bear

Spoor was seen at Shar Khuls oasis in 1974, 1975 and 1976. Droppings and tracks were found at Seg Tsagan Bogd and Toros Bulag in 1975.

Equus przewalskii, Poljakov, 1881, Przewalski's or wild horse

Neither tracks nor sightings have been reported since 1968 (Dobchin, 1970; Tsevegmid and Dashdorj,

Reeds in oasis, Transaltai Gobi

Przewalski's horse (Grzimek)

1974). In recent years regular disturbance by herds of domestic stock at waterholes in the Djungarian Gobi has contributed to the wild horse's decline. After travelling in the area, examining the problems, and discussing the situation with local inhabitants, we are of the opinion that this species is certainly extinct in the wild.

Equus hemionus, Pallas, 1975, Asiatic Wild Ass
This animal is regularly seen in northern and southern parts of the Transaltai Gobi. It is not very numerous but fairly frequent, mainly in the neighbourhood of waterpoints and in canyons where its food is more abundant. In the mountainous parts, numerous conspicuous paths used by the wild ass are frequently encountered. It occurs as a solitary animal or in groups of three to five, sometimes up to eight individuals. The ass is more abundant in the Djungarian Gobi, where large groups of up to 30-40 animals may be seen. A herd of more than 300 animals was recorded at Khonin Usny Gobi in 1974. It was interesting to observe that, like their African relative, the zebra, groups of wild ass invariably attempted to cross in front of the vehicle when it was travelling parallel to their line of flight at close quarters.

Camelus bactrianus, Przewalski, 1883, Wild Bactrian Camel
This species is restricted to the Transaltai Gobi. It is often found in valleys and canyons where the vegetation is more abundant, but it also visits the waterholes in the adjacent plains (Schar Khuls, Khavtag Shand, Maikhan Bulag, Zambilch, Barun and Sun Scharga, Takhilgnii Us). The wild camel occurs mainly in the northern and southern parts of the Transaltai Gobi, but regularly used paths are found in the central Cynhrin Holo area. It can be solitary or occur in groups of up to more than 30 animals throughout the year. During the 1976 expedition, a herd of 18, of which 6 were young, was recorded in the Oni Oundur Nourou canyon, and a herd of 34 with 5 young of the year was observed near Maikhan Bulag. A domestic camel was attached to this latter group but was unable to keep up with the herd when it ran off. This animal was shot and found to be a young male about 3 years old. It was emaciated, possibly diseased and in very poor condition.

It would appear, from information accumulated during the four expeditions mentioned above, that there are four areas in the Transaltai Gobi preferred by the wild camels. These are :

(i) The north-western area including Takhilgiin Us, Maikhan Bulag, Har Hairhany Nuruu and Oni Oundur Nourou.
(ii) A central zone covering Barun and Sun Scharga,

Tsagan Burgas and Schar Khuls Bulag.
(iii) A southern concentration including Ubur Myltys, Havtagai Shant and Zambilch.
(iv) The south-eastern area situated to the south and east of the Segs Tsagan Bogd Massif.

Numerous paths across the desert join these watering and grazing areas, but the pattern of wild camel movements has yet to be elucidated.

With regard to food habits, although no stomach content or dung analyses have been carried out, observations on browsed plants indicate that wild camels commonly utilize *Haloxylon ammodendron, Salsola arbuscula, Caragana spp, Reamuria soongarica, Zygophylum xantoxyllon, Nitraria sphaerocarpa, Ephedra przewalskii, Populus diversifolia, Eleagnus sp.* and *Clematis sp.*

On the basis of observations made to date, it is not possible to give an accurate assessment of the size of the wild camel population of the area. Counts made from vehicles during expeditions are extremely difficult to extrapolate in such a large area with very varied relief and habitat types. The only aerial census attempted to date, by Buindelger and Szaniawski in 1975, was unfortunately hampered by severe storms, although this technique probably holds most promise for the future.

However, having traversed the area and evaluated the data available, we consider that it can be stated that the wild camel population of the Transaltai Gobi probably lies between 400 and 700 heads.

The 1976 expedition was told by local informants that immature domestic male camels occasionally join wild herds but that they usually return after a time. They are certainly physically weaker than their wild counterparts and it would by virtually impossible for domestic males to mate with wild females as they are apparently attacked and driven off by wild males when they mature. However, wild males sometimes visit domestic herds and mate with domestic females.

In the 1976 season, five hybrids were born to domestic females around Gobi Altai Somon, out of a total of about 300 births. The hybrids are said to be more difficult to handle, have shorter hair and longer legs, though the females are noted for yielding more milk. Their shorter hair length, of course, results in low wool production. The hybrids are reported to breed with domestic animals.

A speed of more than 65 km/h was recorded when following a group of three wild camels during 1976.

Bactrian camel (Grogl)

Wolf (N.Y. Zoological Soc.)

Capra sibirica, Pallas, 1776, Ibex
This species is rare in the Gobi region in general, but it is locally common in Seg Tsagan Bogd and Edergiin Nourou.

Ovis ammon, Linneaus, 1758, Argali sheep
The argali is present in Seg Tsagan Bogd and in the Atas massif. It is common in the Edergiin Nourou ridges.

Gazella subgutturosa, Gueldenstaedt, 1780, Goitred or Black tailed gazelle.
This gazelle is scattered and occurs sporadically throughout the southern part of the Transaltai Gobi. It is more numerous in the northern part but usually occurs singly or in small groups. It is very abundant locally in the Djungarian Gobi (about 500 were seen in 1976), where it often occurs in groups of up to 30-40 individuals. The species is, however, completely absent from large areas of the region.

During the 1976 expedition, the black-tailed gazelle was seen mainly in foothills where green grasses and wild onion were abundant. When disturbed they were invariably observed to run towards the plains. They were often found 60-70 km from the nearest waterpoint. At the end of May, several solitary females were seen. It seemed likely that these were fawning, but time did not allow for a careful search for young. In Hallun Somon, where a pair is kept in captivity, the female gave birth to twins in the last days of May. The main fawning season is said to be first half of June.

Saiga tatarica mongolica, Bannikov, 1946, Mongolian Saiga antelope
This subspecies is now reduced to about 200 individuals in the wild and confined to the Shargin Gobi. Four individuals were seen in this area in 1976. A captive group of seven animals (four females and three males) is kept in a large enclosure in Hallun Somon and apparently breeds well.

Prospects for conservation

In order to protect representative samples of the Central Asian desert and semi-desert ecosystems, together with their unique flora and fauna, the Government of the Mongolian People's Republic decided in 1975 to establish protected areas in the Transaltai and Djungarian Gobi areas. The Mongolian authorities subsequently contacted international organizations with a view to securing assistance from international sources in this endeavour. The 1976 mission was invited to Mongolia as a result of these contacts. It should be noted that the habitats in a large proportion of the areas proposed for protection are still undisturbed and that the remainder is only minimally affected by the activities of man. With the exception of the wild horse, *Equus przewalskii,* there are satisfactory populations of the indigenous large mammals still thriving in these areas. Measures have already been taken, or are planned by the Mongolian

Government, to exclude human activities from what will become the Transaltai Gobi National Park and to strictly limit them in what will become the Djungarian Gobi Wildlife Reserve. Domestic stock will continue to be trekked through this area twice a year to and from their winter pastures near the border with China, but they will be confined to agreed routes. Detailed negotiations have taken place with representatives of the local inhabitants with a view to explaining to them the importance of the Park and the Reserve and gaining acceptance of their establishment. The Government is currently taking action to legally and physically establish the Park and the Reserve. In conjunction with this, a programme of international assistance is being developed to help with planning and management of the areas and the institution of an ecological research centre is planned.

There are thus extremely good prospects for the launching of a 3,800,000 ha National Park and 900,000 ha Reserve which will protect a very large and well-preserved sample of arid and semi-arid desert, a fragile biotope which has been irreparably damaged by man in many other parts of the world.

This initiative of the Mongolian People's Republic is taken in the context of its overall longer-term objective, to establish a coordinated national system of parks and reserves designed to preserve representative samples of the ecosystems occuring within its terriory.

Addendum

The legal status of the Great Gobi National Park, comprising the Transaltai Gobi National Park and the Djungarian Gobi Wildlife Reserve, has now been established by Decree 283/1976 of the Presidium of the Great People's Khural of the Mongolian People's Republic.

from **La Terre et la Vie** *Vol 31 1977*

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Ibex (Vollmar)

(Yala) Ruhuna National Park, Sri Lanka (Vollmar)

ECOLOGICAL GUIDELINES FOR DEVELOPMENT IN TROPICAL RAIN FORESTS – PART I

by Duncan Poore

IUCN has recently published a booklet with the title: Ecological guidelines for development in tropical rain forests (Poore, 1976). Since we consider the booklet a very important contribution to the knowledge of wise use of natural resources we have decided to give it extensive publicity by reprinting large parts of the text. The reprinted text is separated into two parts, of which the following article is the first one. The second part will be published in the next issue of TIGERPAPER.

Introduction

The pressing need of the countries in tropical forest regions is to improve the quality of life of their increasing populations while, at the same time, providing the base for a stable and continuing prosperity. The speed of change presents governments with problems of unusual complexity in planning the best allocation and management of land; and these problems are further complicated by growing shortages of raw materials and rising costs of production throughout the world. It is tempting to make rapid capital out of resources that are readily available or to adopt forms of exploitation or use which have been successful elsewhere but have not been sufficiently tested under local conditions.

Ecological knowledge can help in several ways: in the better identification of opportunities to make the best long-term use of the land; in drawing attention to situations where care must be taken if deterioration or other undesirable side effects are to be avoided; and, thus, in providing the decision-maker with a more complete framework in which the lasting costs and benefits of any policy or action can be accurately estimated.

The earlier, therefore, that ecological knowledge is taken into account, the better the use that will be made of local resources in the process of development and the less the danger of costly mistakes or long delays while projects are assessed and reformulated. Perhaps most important, the ecologist can call

attention in advance to courses of action that are likely to lead to any lasting or irreversible deterioration of the resource.

The input of ecological knowledge should, therefore, be early and positive. Ecologists should be intimately associated with the formulation of national objectives and policies as well as during more detailed and technical stages such as drafting legislation, planning the allocation of land to various uses or designing development projects. If the ecological contribution is made at these early and formative stages, its positive and constructive nature will be most evident. If, however, it is delayed until specific actions for development are actually being planned, it is very likely to contain elements of caution and constraint. In such circumstances it is useful to insist that any proposal (whether for new laws or regulations or for a particular development project) should be accompanied by an assessment of its environmental impact so that unforeseen and damaging consequences may be avoided. The "environmental impact assessment" (Munn, 1975) is a useful means of ensuring that ecological experience is taken into account in the process of development, but it should be recognized that this is only a partial and imperfect substitute for making earlier use of this experience.

In either case public consultation is useful in ensuring that policies and decisions are based on as wide a foundation of knowledge and views as possible, while also making the public aware of the whole range of environmental issues involved. The importance of education in the broadest sense cannot be overestimated; for it is only by having a public fully alert to environmental matters and well informed about them that the operation of ecological guidelines will gain wide acceptance.

Ecological predictions can only be made on the basis of facts and these are often incompletely or imperfectly known. Research and survey are certainly necessary in some instances to provide the information necessary to make wise decisions. But there is often a temptation to collect information for its own sake and to be reluctant to make decisions on knowledge already available. The guidelines frequently stress the need for facts and the assessment of facts before taking action; this should be interpreted as meaning *sufficient* facts for the kind of decision to be made. This is a matter of fine judgement which can only be resolved by discussion between those who have to make the decisions and the appropriate specialists—and will vary from case to case.

Each development is in itself a form of experiment. As far as possible, therefore, each project should include provision for "monitoring" checking at periodic intervals the way in which the development is affecting the environment and the extent to which the predictions made beforehand are justified. This process is invaluable in assembling the facts that are necessary to improve the quality of future decisions. The same considerations apply to monitoring as to research; it can become an activity with its own momentum, collecting information which is unnecessarily detailed. While it is an essential ingredient in improving the development process, the objective should constantly be kept in mind when designing programmes. More is not necessarily better; the best is to collect enough but not too much.

Land-use policy and allocation of land to various uses

The natural vegetation of the humid tropical regions is forest. Except for small areas, the uppermost slopes of the highest mountains, for example, and swamps and landslips, the whole land has been covered with trees. This forest is both the richest and has had the longest period of continuous development of any in the world; and much of it, especially in South East Asia and Amazonia, has remained almost undisturbed until very recently.

Previously man had settled widely in the seasonally drier areas but his inroads into the rain forest itself had been limited, and usually confined to tracts near the coast or accessible up the large rivers.

In the fortunate areas where much of the forest cover remains intact, there is still considerable freedom of choice in planning land utilization and the approach can be more flexible because more alternatives are open. These are advantages of immeasurable value and every care should be taken to retain them. A most important characteristic of this forest is that it is self-perpetuating. Undisturbed it will protect soil, water, timber, wildlife and scenery without deterioration or need for any management. It is both the most protective and the least expensive use of land.

But the reserve of untouched forest has rapidly decreased in the last decade and the process is accelerating. This is partly due to the largescale opening up of new land for agriculture, and partly because the best standing timber has been looked upon as a resource to provide investment.

In any well planned development, the allocation of land for particular uses is basic. It should attempt to match objectives to the resources

available; and avoid using resource capital as a substitute for income. If well done, such allocation assigns to each desirable use a proper share of the most appropriate lands available, the end result being potentially more valuable than any known alternative. A prerequisite to this is an evaluation to determine the degree to which different land areas are suited for and will tolerate the various potential uses. This may do much to prevent conflicting claims for the use of land.

Once land has been allocated and used for certain purposes, it is often, though not always, impossible to reverse the process and restore it to its earlier state. This may be because we do not know how to do so—even with all our present knowledge of science the smallest area of tropical forest cannot be reconstructed; or because it is too expensive. The wise allocation of land is therefore of the highest importance for it will ensure the best immediate use and the least possible restriction of future use.

In this connection it may be helpful to consider the degrees of change to which the forest (or other natural ecosystems) may be subjected—as follows:

- *Primary, unmodified forest.*
- *Modifications of forest,* e.g. forest managed for production of timber or other produce, for wildlife, recreation, etc. Cycles of shifting cultivation in *balance* with their environment.
- *Transformations from forest* in which the natural forest is totally removed and replaced by trees (forest plantations, fruit or cash crops), arable or pastoral farming, or structures (roads, towns, reservoirs, mines, etc.).
- *Degradation of site* by erosion, invasion of weed species, etc.

If areas are suitably chosen with proper respect for their ecological characteristics, modifications and transformations can be carried out with no loss of fertility; and indeed the capacity of a site for a chosen use may be greatly enhanced—for example by terracing and irrigation. But it is either impossible or very expensive to return to an earlier use. It should, therefore, be recognized that many decisions to transform or modify are for practical purposes irreversible. Misallocation or mismanagement may, of course, lead to such degradation that the value of the site for all uses is permanently impaired.

Wise and successful allocation of land depends on facts which may best be supplied by environmental resource surveys.

For *agriculture and plantation forestry,* the main prerequisites are a knowledge of the climate and soil, the relative importance of these varying according to circumstances. For the *management of natural forests for timber production* the present composition of the forest and its potential for adequate regeneration are important. In both accessibility to markets and availability of labour

Gunung Leuser Reserve, Sumatra (Rijksen)

have to be taken into account. For *natural areas which are to be retained and managed as such* it is their present vegetation and fauna, the extent to which they are either unique or representative of important ecosystems, and their intrinsic characteristics that are important. Each area may also have environmental characteristics which makes it suitable for other forms of development such as mineral extraction, dam or road construction, the siting of new towns, etc.

Where detailed surveys of climate, soils, vegetation and fauna, mineral resources, topography and hydrology are available, these may, with suitable interpretation, supply the required information. If such surveys are not already being carried out, they should be started as soon as is feasible. Of particular importance is the early setting up of a regional meteorological network and the systematic collection of relevant statistical information (on population, health, hydrology, etc.).

But, where such detailed surveys are not available, there are short cuts which will provide very valuable information. Much can be accomplished by the use of remote sensing or by air photography, such as the extensive surveys carried out in Kalimantan, W. Malaysia and Sarawak. Vegetation surveys can also be valuable for regional planning. These proceed from the premise that vegetation, especially undisturbed vegetation, gives a good general measure of climatic conditions and thus of the potentialities and limitations of an average site for various kinds of land use. Within each zone there are of course extreme sites where the nature of the soil overrides or compensates for the influence of climate, and offers special potentialities or imposes special constraints. In most circumstances knowledge of both climate and soil is necessary to assess capability reliably.

Because the majority of the nutrients on a site covered by tropical forest are in the vegetation at any time, the luxuriance of the forest is no measure of the fertility of the soil on which it stands. If cleared carefully, so that the structure of the soil and its nutrients are retained, some forest soils are fertile, others infertile. If intended for agriculture, soils must be surveyed according to their potential for agriculture and the findings of surveys should be supplemented by crop trials before large areas of forest are opened up. Unless these are promising, land should be left as unmodified or as managed forest.

Guidelines

Decisions on the designation and allocation of land for various uses should be based on as much relevant information as possible.

A proper understanding of each different kind of land—its separate "capability" for different uses and the constraints which must be observed when it is manipulated for productive purposes—is necessary in order that the merits of alternative patterns of development may be compared.

1. When they are not already available, national and regional resource surveys should be undertaken as soon as possible to provide the facts. For example: on social structure, climate topography and land form, soils, vegetation and fauna, mineral resources and hydrology.

2. Until the results of detailed surveys are available, the greatest use should be made of the results of remote sensing and of vegetation as a measure of climatic and soil characteristics.

3. Capability should be assessed separately for each possible use or value of the land. For example: potential for mineral extraction, agriculture, timber production; suitability of settlements, roads, dams, tourism; intrinsic value for conservation as examples of ecosystems, to preserve genetic resources of plants and animals, as beautiful landscapes, or as sites of historical or archaeological value.

4. Existing surveys may need to be supplemented or reinterpreted in the light of new knowledge and changing social priorities.

The development of any region should be planned as a whole in order to make the best present and future use of available resources through a comprehensive and integrated approach to development.

5. A total catchment area is recommended as an appropriate unit for planning, which should include the infrastructure of settlements, roads, dams, water supply, siting of saw-mills, processing plants for agricultural produce and other industry.

Planning should provide for foreseeable requirements and should be based on the present and likely future needs of the community as determined by its chosen life style.

Decisions which are damaging to the lasting potential of natural resources are often taken under conditions of stress.

6. Any action contrary to the inherent capability of

Gir Forest Wildlife Sanctuary, India (Vollmar)

the land should be resisted.

7. Before felling or major harvesting of forest produce, an assessment of the possible final use of the land should be made in order to enable proper phasing and planning for development.

The environmental effects of alternative courses of action and legislative proposals should be assessed in advance in order to ensure that long-term costs do not outweigh shortterm benefits.

8. National interests must be balanced against the interests of any special groups in the community.

9. The effects of alternative courses of action on the region in question,its surroundings and, in particular, on the whole catchment area of any affected river system must be evaluated through an "environmental impact assessment" or other appropriate means.

Planning should be undertaken as far as possible in consultation with those likely to be affected. This may have to be done gradually and by stages.

10. Local consultations should be initiated at each stage of planning in order that the full social costs and benefits of alternatives may be evaluated.

Land which is capable of many uses should be retained as far as possible in order to maintain the widest possible choice for future generations whose needs and skills may be different. The greatest care must be taken over any decision that will lead to irreversible change.

Conditions may change in such a way that the original resource would have proved more valuable than that which has replaced it. For example: agricultural land rather than a resevoir; a unique example of natural forest rather than degraded grassland.

11. In the course of land-use planning it may be decided to leave forest untouched in order to have a reserve of unallocated land. But in the case of protection forest, national parks and nature reserves, land should be allocated specifically for these purposes.

12. Before deciding to modify or transform untouched areas, every consideration should be given to alternatives. For example: adapting to more productive uses areas that have already been changed (e.g. using savannas for pine plantations); intensification of existing uses; using areas for more than one purpose if these are compatible.

Arrangements should be made, as part of the planning process, to monitor and evaluate the effects of any major development.

The result of this evaluation may be used, if necessary, to modify the course of development and will provide experience to guide future ventures.

13. Significant variables, including those listed in guideline 3, should be observed and the effects of development evaluated.

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SIBERUT: CONSERVATION OF INDONESIA'S ISLAND PARADISE

by Jeffrey A. McNeely

A million years ago Sumatra was quite different than it is today. Most of the soil forming the eastern lowlands was still up in the central Barisan range and had not yet eroded down towards the sea; the west coast, on the other hand, extended some 120 km further west than it does today, forming a wide, flat shelf of alluvial deposits. This shelf was covered in rainforest and held a wide range of wildlife, including the ancestors of many forms still found in Sumatra today. It seems quite likely that an early gibbon ancestor was there, along with an early form of the pig-tailed macaque, one of the precursors of the *Presbytis aygula* group of langurs, and an early form of the unique proboscis monkey.

But earth-rending changes were soon to come. Mt. Toba in north Sumatra erupted spectacularly, throwing out some 1,500 cubic kilometers of volcanic tuff, the Barisan range running down the spine of Sumatra was further upthrusted, and the old alluvial plain along the west coast was folded into a deep depression close to the mountains and a range of low-lying hills along the sea edge. The oceans rushed in to fill the depression (up to 1,500 meters deep in places), isolating the newly formed hills as offshore islands; remnants of the early Pleistocene coastal lowlands survive today as the chain of islands parallelling the west coast of Sumatra, from Simalur in the north to Enggano in the south.

Toward the southern end of the chain lie the Mentawai islands, the largest of which is Siberut, with an area of 4,480 km^2 (nearly the size of Bali). While some of the other islands may have been intermittently connected with the mainland, Siberut and the Mentawai islands have remained isolated. This long period of isolation has resulted in a fauna which is unique in the world in its number of endemic primates on such a small land area. No less than four endemic species survive, and two of them have split into separate subspecies on the southern Mentawai Islands (Sipora, North Pagai, and South Pagai).

While evolution has continued on the mainland of Sumatra at a rapid rate due to alternating connections and disconnections with the mainland of Asia with the changing sea levels of the Pleistocene epoch, the primates on Siberut seem to have evolved much more slowly, and are thought to represent the most primitive members of their groups. For example, Kloss' gibbon *(Hylobates klossi)* has the most complex of all gibbon calls, containing elements found in the calls of all the other gibbon species (Tenaza, 1976); the Mentawai langur *(Presbytis potenziani)* is the only known Old World monkey which lives in male-female family groups, a social organization from which the more complex "harem" groups of other langurs may have evolved (Tilson and Tenaza, 1976); the Mentawai snub-nosed langur *(Simias concolor)* is most closely related to the proboscis monkey of Borneo (Groves, 1970), but is rather less specialized physically and lives in much less complex social groups (often, though not exclusively, in family groups) (Tilson, 1977; Kawamura et al, 1977); and the Mentawai macaque *(Macaca pagensis)*, while a distinct species, seems to be the precursor of the pig-tailed macaques *(M. nemestrina)* which are widespread throughout southeast Asia. It is also interesting to note that primates comprise no less than 50% of the total species of mammals weighing over 1 kg, a very high proportion indeed.

But primates are not the only unique animals on Siberut. There is also an endemic species of squirrel *(Callosciurus mentawi)*, plus 10 other endemic subspecies of mammals, including a common palm civet *(Paradoxurus hermaphroditus lignicolor)* which is the only form of the species which lacks spots and stripes (Chasen and Kloss, 1927). Among the birds there are no endemic species, but no less than 14 species have evolved endemic subspecies, including a spectacular form of the Crested Serpent Eagle *(Spilornis cheela sipora)* (Chasen and Kloss, 1926; Ripley, 1944). The reptiles are still under

investigation,but early indications are that there are several endemic species among them as well. The vegetation is spectacular tropical rainforest, containing about 15% endemic species, and is thus a great storehouse of genetic resources; many of the forms are rather primitive within their genera (House, pers. comm.) The Mentawi islands are thus unique in all the world, and provide an unmatched laboratory for evolutionary studies (see, for example, Ripley, 1944) and studies of island biogeography.

Kloss' Gibbon, Hylobates klossi, one of four species of primate endemic to the Mentawai Islands (photo Seidensticker)

There is no good indication of when man first arrived on Siberut, but judging from their language, cultural level, and physical characteristics, the people of Siberut seem to be representatives of some of the earliest *Homo sapiens sapiens* to come to Indonesia; most anthropologists classify them as "proto-Malay", indicating that they arrived in the Mentawai islands at least several thousand years ago (summary in Suzuki, 1958). In many ways they are among the most archaic people in Indonesia. In pre-contact times, they had no tobacco, alcoholic drinks, village chiefs, pottery, crafts specialists, rice or other food grains, or cloth. They did not live in villages but rather in clan houses called *umas*, located within a clan territory on one of the many rivers that provide the only transport network in Siberut; each *uma* would contain up to 20 families belonging to the same clan. Their religion was animism, and they believed that everything from people to monkeys to rocks to weather had its own spirit which was quite separate from its "host" and was free to wander as it wished (Schefold, 1923).

Their subsistence pattern was essentially hunting and gathering, with only a bit of primitive dibble-stick agriculture which did not even require that fields be burned. In the incredibly rich low-lying swamps they harvested the sago palm which is perhaps the plant by which man can obtain the largest yield with the least labour (Nakao, 1966, in Kawamura *et al*, 1976). Pigs were the only domesticated food mammal, and were allowed to run freely, mixing with true wild pigs found on the island. Trees were cut for making houses or light, graceful dugout canoes; the preferred species of meranti *(Shorea)* and every suitable tree in the forest was owned by an individual and earmarked for future use.

The men hunted with bow and poisoned arrows with neither rock nor iron arrowheads; the arrows were unfletched. While they also hunted both pigs and sambar deer, the monkeys formed their most important and prized game; gibbons were not hunted as being too human-like and likely to bring misfortune to the hunter.

In such a rich habitat, the people evolved an intricate balanced relationship with their environment, and it is instructive to summarize briefly some of their cultural controls on the overconsumption of their resources, particularly primates. One method of control was the *uma*, or clan house, to which all members of the clan belonged. Decisions were made by consensus, and those who could not live with the consensus were turned out of the clan and clan house; members of the *uma* shared food freely and there was no stimulus to acquire wealth or produce a surplus, and status was acquired by being a "good person". Several times a year, the *uma* would sponsor religious festivals for the clan. These festivals, called *punen*, were periods of several weeks to several months comprising series of ceremonies with both sacred and profane dimensions; most of the population abstained from work and from sexual intercourse during the festival. As part of the *punen*, the men would go out to hunt monkeys (in earlier times, they also hunted men from the southern Mentawai islands, bringing back their heads); a successful monkey hunt was

essential to the successful conclusions of the *punen*, and monkeys were apparently hunted only during *punen* (Nooy-Palm, 1968).

The hunt was carried out by family fathers and young men, with a long series of preparations without which the hunt would fail (Nooy-Palm, 1968). The men had to hunt as individuals and not in a group; otherwise, the solitary monkeys which were being sought as prey would escape back to the group of their fellows (Loeb, 1929). The use of traps or dogs in hunting was considered taboo. Before hunting, the men would attempt to lure the souls of the monkeys into the *uma;* then when the hunter would meet one of the animals in the forest whose soul is in the *uma*, the living animal would like to rejoin its soul and would thus fall easy prey to the hunter. For this reason, monkey skulls were cleaned, decorated, and hung up in the *uma* with other monkey skulls in order to make the *uma* an attractive place for the spirits to live. All of these cultural restrictions on hunting (as well as similar restrictions on other forms of resource utilization) resulted in a culture which lived in balance with its available resources, an admirable state of harmony with nature which many modern societies are only now beginning to recognize as vital to their own continued existence.

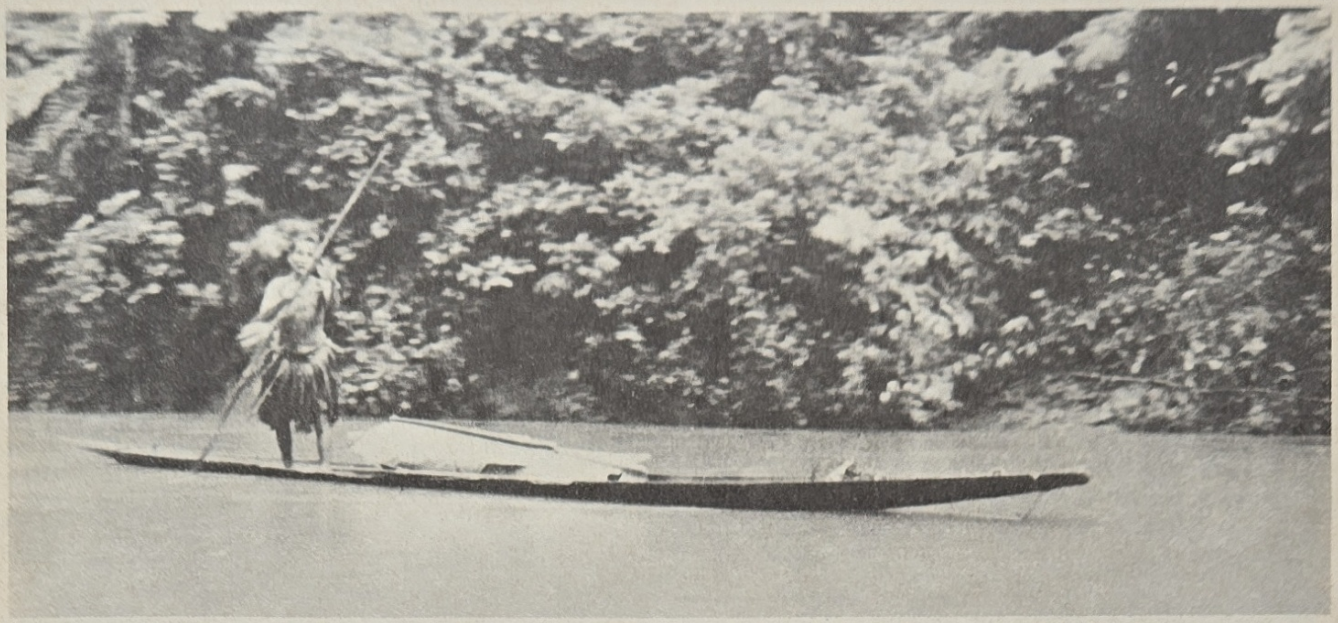
But despite all that modern societies can learn from such balanced societies, such an ideal "state of nature" can hardly continue to exist in modern times, and Siberut is changing from a self-sufficient ecosystem to becoming just a small part of a "world ecosystem" interconnected by international trade.

There has been sporadic contact between the Mentawaians and people from the mainland for hundreds of years, but it was not until the early years of this century that lasting change was to come. Protestant missionaries first landed in 1902 and stayed for a few years before returning to stay in the 1920s. There were several immediate effects of this development, the most important for conservation being that taboos and ceremonies were weakened so that hunting of primates was no longer under traditional regulation and was no longer restricted to ceremonial occasions; traps are now being used in some areas, gibbons are being hunted for the first time, and men are hunting in teams with dogs, all of which means that hunting is now becoming a greater threat to the existence of the primates.

The *umas* were replaced by villages around the churches close to the coastline, with the resulting weakening of social control by fellow clan-members; only 3 *umas* now remain, in the remote southwestern part of the island. Cloth rather quickly replaced bark and banana leaves, meaning that the people were forced to produce a cash crop with which to purchase the cloth; the acquisition of wealth became a strong stimulus to produce a surplus; ricefields are being established; and sago is being discouraged.

Another development is that virtually all of Siberut has been given out as timber concessions, mostly to foreign companies. The logs are floated to Singapore, with minimal benefit to Indonesia and none whatsoever to the people of Siberut. In fact, the timber concessions are of direct cost to the local people, since the *Shorea* species which is used to make canoes is also the prime market species which is exploited by the timber concessions. This development means that there will soon be a shortage of canoes, thus making transportation more difficult for the people. While the early logging was highly selective, was confined to the coastal areas, and used only primitive methods, the new concessions are using sophisticated modern equipment and taking many of the trees which the people of Siberut consider theirs. The new concessions are also destroying habitat for

Skull of sambar, Cervus unicolor, and two monkeys, Macaca pagensis and Presbytis potenziani, decorated with leaves and flowers to make them more attractive to its spirit, so that the spirit does not want to wander from the body and get into mischief. (photo Seidensticker)



Mentawaian woman dressed in banana leaves poling her dugout downstream; the dugout is made of meranti (Shorea sp.), the most valuable timber tree on the island and one that is quickly disappearing due to logging. (photo McNeely)

three of the four species of endemic primates, and the main logging roads are cutting off the movements of gibbon and langurs.

So while conservation in traditional times was assured by primitive weapons and tools, cultural sanctions, and a complex system of taboos, in today's world, where change is the only constant, new methods of conservation of resources are required. The Government of Indonesia is well aware of the situation, and has initiated a programme to conserve the ecosystems of Siberut, with particular emphasis on the endemic primates.

One way to reduce hunting of primates is to make more protein available from other sources, and an organization called Survival International, based in the United Kingdom, has recently agreed with the government to implement a US$ 100,000 programme to improve the protein supply through improved husbandry of pigs and chickens, introduction of water buffalo, implementation of fish breeding (both in natural and artificial ponds) and improvement of offshore fishing techniques. In addition, they are also planning to promote growth of certain cash crops, notably cloves and nutmeg. The Survival International programme is designed to allow the people of Siberut to keep their cultural identity to the degree they themselves want to, so that outside influences would not threaten the way of life of the people of Siberut as Indonesian citizens with a local cultural heritage of great value to the nation as a whole.

Certainly an improved supply of protein, coupled with more intensive growth of cash crops and rice which leaves less time free for hunting the elusive primates, could reduce hunting pressure. But at the same time, many of the suggested changes, such as introduction of buffalo and cash crops, could have some unpredictable effects on the forest, and it is thus important to set aside a few areas where none of the effects of modernized man will be felt; such areas would also be excluded from timber concessions, but would be able to be used by local people in traditional ways.

As part of the Indonesian government plan for the development of Siberut, the Directorate of Nature Conservation has already established a reserve in the central part of the island; however, this area includes several large settlements and some timber concession areas and does not have natural boundaries, so some improvement in the reserve system of Siberut is required. With financial support from World Wildlife Fund, a team led by Mr. Anthony Whitten of Cambridge University is currently surveying the primates and vegetation of Siberut and will shortly produce a management plan which will propose a suitable system of reserves for the island and its offshore waters. WWF support will also contribute to the establishment of the reserves through supplying equipment and support for the system of guards.

Thus while Siberut's age of innocence is surely past, efforts are being made to assure that its transition into the modern world will be as graceful as possible, and that its unique fauna will be able to survive as an expression of the great natural diversity of Indonesia.

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Typical field house of the people of Siberut, blending with the forest setting. (photo McNeely)

FORESTRY AND CONSERVATION IN THE SOLOMON ISLANDS AND THE NEW HEBRIDES

by M.A. Hoyle

In TIGERPAPER IV: 4 we published an article on forestry and conservation in Papua New Guinea. The article below deals with forestry and conservation in the Solomon Islands and the New Hebrides, and is from the same author.

The Solomon Islands

Information on the Solomon Islands was gathered during a visit to the Protectorate in mid–1975. As far as I know, the situation is relatively unaltered since that time.

The Protectorate lies to the east of the New Guinea mainland and consists of all the islands (10 major ones) of the Solomon Group except Bougainville. The main islands are Guadalcanal, Malaita, Choiseul and Santa Isabel, and all have mountainous interiors. There are variations in species–dominance in the forests from island to island as might be expected; on Guadalcanal *Pometia* dominates while on Santa Isabel *Campnosperma* is dominant, although this species suffered badly from a cyclone in 1972.

Forestry in the Protectorate is conducted in a rather haphazard way, with various projects or proposed projects scattered over the area often having serious local effects. The most seriously affected case is Gizo, a small island off Kolombangara. This inactive volcanic island in the Western District is the site of logging operations which plan to clearfell the whole island. On Kolombangara itself clearfell logging has already depleted the forest by two–thirds. There is also a proposal to log Rennell, a raised coral atoll in the far south of the Central District.

In addition to clearfelling, other methods practised in forestry can be harmful from a conservation standpoint. Replanting is not always carried out and the Forestry Department must usually give an economic justification for replanting. Line replanting is employed only on a selective basis for fast growing timber, and whilst native species are now used, it is a

possibility that introduced ones will be used at some future stage. Since its stands were almost completely devastated by the 1972 cyclone, Santa Isabel is an obvious candidate for replanting schemes of this nature.

Conservation aspects

The island of Gizo, now threatened by clear-felling of its whole timber stand, is an important case for conservation because it has an endemic bird, the Gizo White–eye *(Zosterops luteirostris)* which is at best rare due to the small size of the island.

Kolombangara's forest is of interest because of the relatively large number of tree species, and it would seem unnecessary to log the whole of the lowland area, leaving only the inaccessible slope forest.

Rennell's case concerns the proposal to mine bauxite on the island. There is a freshwater lake at one end of this raised atoll where the lagoon used to be. This has a population of endemic "freshwater sea snakes" *(Laticauda crockeri)* which may be threatened by proposals to utilise the freshwater resource for slurry and for supply to a woodpulp/woodchip mill. Although it was recently announced that the mining proposal has been called off, it may still remain a possibility at some later date.

On Guadalcanal, the Protectorate's only National Park, the Queen Elizabeth Park, has suffered through neglect. Its *Pometia*–dominated forest has been severely degraded by the activities of people establishing gardens. The laws exist to declare "Controlled Forests" (if the establishment of the National Park was not enough), which allows for dictatorial powers in relation to the forest so declared. Even if this is a serious problem, the Environmental Quality Committee set up in 1975 may help to overcome such difficulties in the future.

Summary

From a conservation viewpoint, forestry practices in the Protectorate are rather depressing. Not enough consideration is given to the ecological effects of logging and small–scale operations are planned or undertaken in several small areas rather than utilising larger blocks on larger islands.

However, it is not so much the present extent of forestry practices which is a problem (except in isolated cases like Gizo and Kolombangara), but rather the extent of projects that are proposed, and the methods which are to be employed. The introduction of foreign species is always a risky procedure, especially in isolated communities, and the Solomon group is one of the best areas in the world to show speciation on islands.

The New Hebrides

Information contained in this section was gathered during a visit to the Condominium in September 1975. The situation has little altered since then.

The Condominium consists of 12 major islands plus many smaller ones, scattered through a rather irregular Y–shaped chain approximately 500 miles long to the south of the Solomon Islands and north-east of New Caledonia. Most of islands, including the two largest, Espiritu Santo and Efate, consist of a mountainous dissected plateau surrounded by a narrow coastal strip. They are covered with dense Tropical Rainforest which is largely sub–climax, and low-growing by tropical standards due to the frequency of cyclones.

Due to the generally sub–climax nature of the forest, logging is not a widespread activity, though there is considerable interest in the cattle industry, and much forest is cleared for this. Efate has some felling (mainly *Elattostachys, Syzygium* and *Terminalia spp.*) on 5,000 ha., and a small sawmill. No replanting is carried out since the land is then turned over to cattle pasture. Much of the peripheral coast is now pasture with a few trees scattered over it. There is a possibility of a woodchip scheme on Espititu Santo. The only extensive logging is carried out in the exploitation of Kauri Pine *(Agathis obtusa)* stands on Erromango and, on a smaller scale, on Aneityum.

It is a possibility that 14 pioneer species will be

Hairy orchid from New Hebrides

introduced for plantations. Only 10–20 pioneer species are good for timber in the world, and only 5–6 occur in the New Hebrides. The necessity is for pioneer species because of the possibility of serious cyclone damage every 50–60 years, and so a fast-yield is required. Fortunately it is not planned to replace large areas with these plantations. By 1985, 1.4 million ha., in groups of 5,000–6,000 ha. will have been planted, the effects of which would depend upon their location; obviously problems could arise if small islands were used.

Conservation aspects

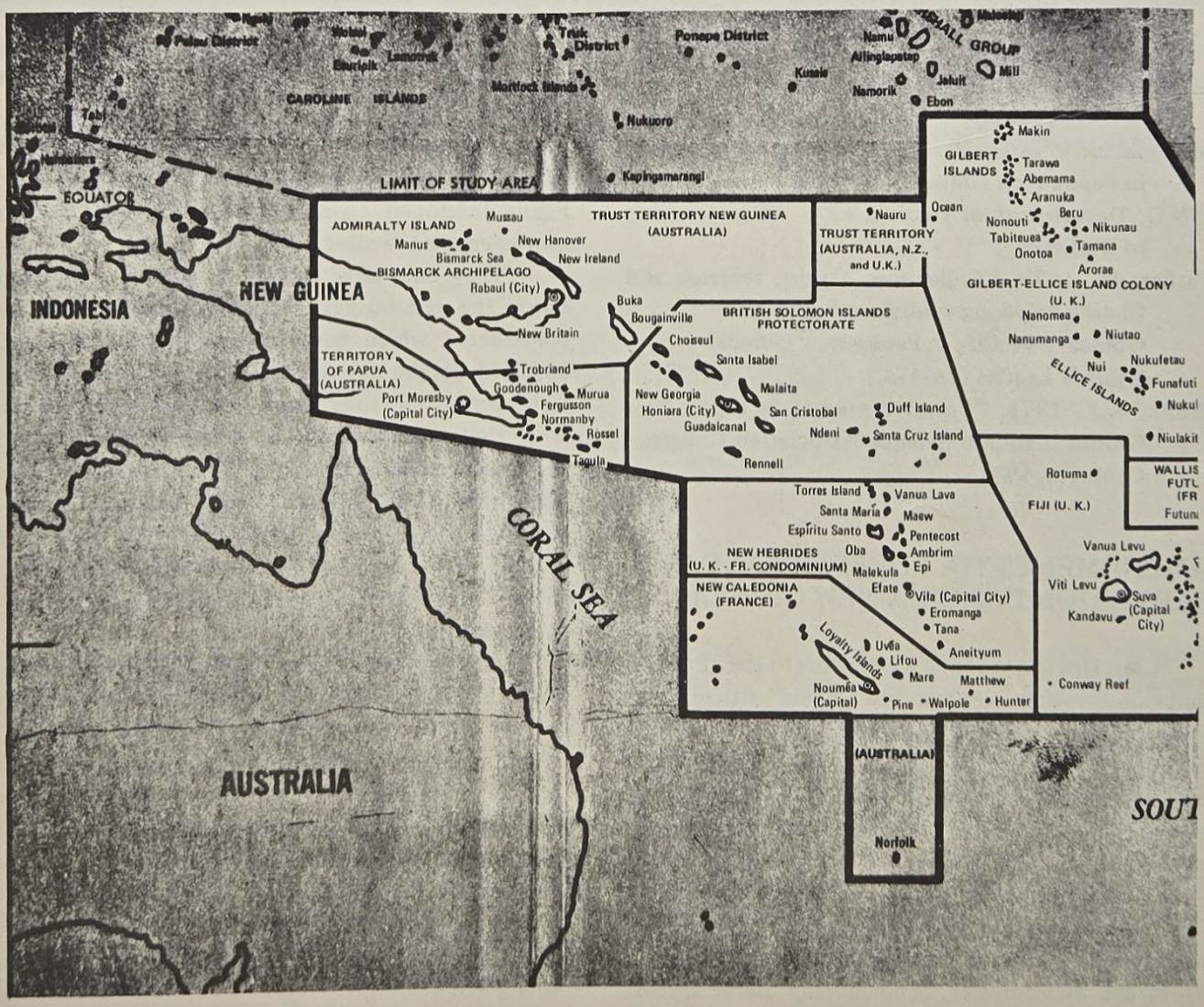
The only problem which urgently needs attention is that concerning the cutting of Kauri Pine. Stands of this endemic broad–leafed conifer represent the only substantial area of high–canopy forest in the Condominium, and due to this uniqueness, concern has been expressed regarding the operations (by A.G. Marshall) as far back as 1973. The felling license is due to lapse this year and will probably not be renewed. That means that if enough pressure can be generated, the area could be protected as a Nature Reserve, as originally proposed by the Royal Society and Percy Sladen Expedition of 1971.

Other reserves have been proposed over the years, including an area of forest surrounding Duck Lake (with a breeding population of the rare "Japanese Duck", *Phalacrocorax melanoleucus,* which is actually a cormorant) on Efate, but due to lack of finance or interest on the part of the Joint Administration, and land tenure problems, none have been created.

Land tenure has been a problem here because until recently (late 1976) there was no provision for Public (or Condominium) Land. This meant that no land could be purchased by the Joint Administration for use as Nature Reserves, etc. This was especially a problem with the Duck Lake Reserve proposal because the land needs to be purchased (or leased as Public Land) from Société Francais des Nouvelle Hebrides. Some progress has now been made, but finance will still have to be found.

Summary

Except in the special case of Kauri–felling on Erromango there is no major logging operation in the Group, but clearing of land for pasture can be a



serious problem in certain areas like Efate. As far as the Kauri operations themselves are concerned, it could be that what now remains of the Erromango stands can be preserved by order of the two Resident Commissioners. The Aneityum stand and relict stands on Espiritu Santo could also be assessed for protection.

With the land tenure issue simplified it is also time to reconsider the Duck Lake Reserve on Efate.

What is needed is international encouragement to support the efforts of the Governments and Administrations in Melanesia to protect their unique forests from short–sighted exploitation for short–term gain.

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AMENDMENTS TO: FORESTRY AND CONSERVATION IN PAPUA NEW GUINEA

Mr. Hoyle has added a few notes to the "Forestry and Conservation in Papua New Guinea" article which appeared in TIGERPAPER Vol IV No 4. 1). The number of plants species for Papua New Guinea quoted refers to vascular plants. Of the non–vascular plants Algae probably number 1,000 species and mosses may be 500 species. 2) The number of "tree –size representatives" quoted as 200, is misleading, but this was due to the reference used (White, 1973). He quoted the figure 200, while not specifying that he meant, as a forester, commercially usable species. The total number of tree–size representatives is between 3 and 4,000. 3) The area figures quoted came from the Dept. of Forests "Compendium of Statistics" 1974/75, and therefore may be somewhat out of date.

SUCCESSFUL CONSERVATION OF PAKISTAN'S BLIND DOLPHIN

The Blind Dolphin of the River Indus in Pakistan, which appeared to be threatened with early extinction, is now increasing in numbers following conservation measures taken by the Pakistan authorities with assistance from the World Wildlife Fund.

Professor Georg Pilleri and Miss Jane Knuckey of the Brain Anatomy Institute, Bern, Switzerland, who have been carrying out scientific studies, have reported that there are now 198 dolphins in a sanctuary between the Sukkur and Guddu barrages, nearly 30 of them babies. This compares with 50 counted in January 1974.

The Indus dolphin *(Platanista indi)* is one of the few species of freshwater dolphins - others are in the Ganges, Yangtse, Amazon, Rio de la Plata and Orinoco. Living in murky water sight has little value to the Indus dolphin and it has become blind, relying on highly-developed sonar or echo-location for free movement and feeding.

They once lived in large stretches of the Indus, but in the past 60 years dams and barrages have been constructed which have restricted their movements and split up the population. Isolation and concentration permitted their easy capture by fishermen.

Following early reports by Professor Pilleri of the threat to the Dolphin, the Government of Pakistan established a 130 kilometre long sanctuary between the Sukkur and Guddu barrages in 1974 - in fact the world's first dolphin sanctuary. Strict enforcement of the ban on hunting has been carried out with fines for the occasional culprits.

"If this control can be maintained in coming years the badly-decimated population will be able to recover and increase, making it possible to reintroduce Dolphins into areas where populations have suffered, such as in Punjab rivers", Professor Pilleri said. He has recommended that protection be extended to the whole river, and that two pairs of Dolphins should be transferred to a lake for study and breeding.

from **WORLD WILDLIFE FUND Press Release** *No 4/1978*

Bull gaur (McDougal)

THE KRAU GAME RESERVE

by John Payne

The Krau (or Kerau) Game Reserve encloses an area of almost 200 square miles (more than 500 sq. km.) in the state of Pahang, West Malaysia. The Western boundary of the Reserve includes the summit of the Benom massif which rises to 6,914 feet, one of the highest peaks in the peninsula. The massif falls away through a variety of forest types to the south and east and beyond its foot hills is the lowland Dipterocarp forest of above 140 feet.

The Reserve comes under the administration of the Wildlife and National Parks Department of West Malaysia and has so far survived pressures from several quarters to have the valuable lowland area logged, although some excisions have been made during the last decade. During this period a great deal of ecological research in connection with primates, squirrels and tree phenology has been carried out in the lowland forest.

Established in 1923, the Reserve then covered about 230 square miles and its boundary was within a nearly continuous tract of vegetation, disturbed only by clearings made by the orang asli (aborigines)

of the Jah Hut and Che Wong tribes. The Reserve was set aside primarily to protect the seladang *(Bos gaurus)* the largest extant species of the Family Bovidae, known elsewhere as the gaur.

Over the past 15 years large scale rubber planting has crept to the edges in the south and a large portion of lowland has been excised in the east for a new road and in the north-east for timber. About 30 square miles has thus been excised in the last decade.

Apart from terrorist activity, former disturbance was limited to orang asli activities; planting food, jelutong tree tapping for chewing gum, hunting small game, fishing, collecting fruit and rotan. A few small groups of the nearly extinct, little known Che Wong orang asli live permanently within the Reserve around the upper reaches of the River Lompat. Jah Hut orang asli sometimes enter the eastern edges to collect forest products. Much more serious however, to the survival of large animals and to the feasibity of research, is that the hill areas of the Reserve are a "no entry" area because terrorists and Malaysian security forces are active there.

Poaching is apparently not a serious problem but this state of affairs is unlikely to continue when the rubber trees are mature and now that the new road is completed.

Accounts of early expeditions have been published in 1903, 1924, 1927 and 1931. A major expedition was conducted in mid-1967 jointly by the British Museum (Natural History), University of Malaya, Forest Research Institute and Institute for Medical Research (Kuala Lumpur) to the summit near the north-west boundary of the Reserve.

Gunung (Mount) Benom is granite; the soils of the lowlands are sandy, suitable for rubber and oil-palm. Five floristic zones may be recognised within the Reserve. Lowland dipterocarp forest up to 1000 feet; hill dipterocarp forest to 2500 feet; upper dipterocarp forest to 4000 feet; montane oak forest to 5000 feet; and montane ericaceous above 5000 feet. Researchers at Kuala Lompat have a still incomplete list of 400 species of trees in one square kilometre near the post. About 100 species of lianas are similarly listed. Strangling figs are numerous in the area; the fruit is important in the diet of many arboreal mammals and birds.

The Reserve is drained primarily by three rivers, all flowing to the south-east from the foot hills below Gunung Benom. The River Krau joins the River Lompat at Kuala Lompat. The River Teris is separate and forms the south-west boundary of the Reserve. The River Lompat, its whole length flowing undisturbed by any permanent human settlement in flat lowland dipterocarp forest is now unique in West Malaysia.

At Kuala Lompat rainfall has been recorded for 62 complete months during the past eight years, indicating a little over 200 cm. rainfall each year. The pattern of rainfall at Kuala Lompat varies but there is a tendency for February to be the driest month with wet spells in April-May and in August before the wettest time of year which comes between October to January.

The fauna contained within the Reserve is diverse because of the range of altitude and because the primary lowland forest is still of a sufficiently large area. Amphibians and reptiles were collected from Gunung Benom during the 1967 expedition. The expedition identified 191 species of birds and 81 of mammals. In 1971, 156 species of birds had been identified near Kuala Lompat of which 141 were breeding residents. Since then, a number of species have been added to the list including large ones such as two hornbill species, the great pitta and masked finfoot. The colugo, 18 species of bats, 2 of tree shrews, 7 of primates, 11 of diurnal squirrels, 2 of flying squirrels, 11 of rats, 2 of porcupines, bear, otter, weasel, marten, mongoose, 5 species of civets, clouded leopard, elephant, tapir, common and bearded pigs. 2 species of mouse deer, barking deer, sambhar deer, and seladang have all been observed near Kuala Lompat within the last few years. Tiger, leopard, leopard cat, serigala (wild dog) and serow have been identified further into the Reserve. The rhino may still occur in the foothills of Gunung Benom but not now in sufficient numbers to be important to the survival of the species.

There are at least two herds of elephant. One of the herds of seladang appears to have been reduced in size because important forest, containing salt licks, to the south-east, has been cleared or disturbed and those animals that enter the new plantations are poisoned by weed-killer on the grass. The Krau river valley, formerly used by seladang and elephant, is now the eastern edge of the Reserve and a road has been constructed along its eastern bank. The beautiful and unspoilt River Lompat area is ideal habitat, especially for seladang, and it is likely that the Reserve could support more of these animals than live there now. A big field of 30 acres (Padang Senderok), cleared 10 years ago, is hardly touched by large mammals.

Entry into the Reserve requires a permit from the Wildlife and National Parks Department and the Temerloh District Police too. Access is limited to people with a special interest, usually researchers. There are four Ranger Posts on the Reserve boundary and there is a trail around the boundary with some marker posts, but the trail needs to be re-cleared; this will be done in the near future by the Wildlife and

National Parks Department.

The importance of the Krau Game Reserve has been mentioned in connection with its containing the largest piece of flat lowland dipterocarp forest remaining in West Malaysia. Animals are undisturbed and much less shy of man than elsewhere because they are not hunted.

David Chivers, in his study of siamang *(Symphalangus syndactylus)* during 1968–70, collected most information here because the group near the Kuala Lompat Post became completely habituated to the presence of human observers. This particular group is still observed regularly, eight years from the original observations, unique amongst studies of tropical rain forest mammals. A family group of gibbons *(Hylobates lar),* whose range overlaps that of the siamang, was followed intensively in 1973 and 1974–76 (by John and Kathy Mackinnon and Jeremy Raemaekers). In 1970–71 a comparative study of the two species of leaf monkey, *Presbytis melalophos* and *P. obscura,* was conducted (by Sheila Hunt Curtin), and in 1974–75 a study of the long–tailed macaque, *Macaca fasicularis* (by Relham Aldrich–Blake). The knowledge of these primates thus obtained, and their habituation, was useful to John Fleagle, who studied the differences in locomotion and habitat use of gibbons and leaf monkeys in 1974–75.

All the studies mentioned so far have been conducted by overseas workers. Two Malaysians are involved in current studies. The macaque group of Aldrich–Blake is used by Mah Yoon Loong (University Malaya) in a comparative study of this species in natural and man–made habitats. Louis Ratnam, Research Officer of the Game Department, has begun a study of the mouse deer *(Tragulus javanicus* and *T. napuh)* at Kuala Lompat.

1977–78 will see increased activity in the Reserve; censuses of larger mammals and trees, re–clearing old trails and padang (fields), new houses at Kuala Lompat and a transect up Gunung Benom. The WWF International is contributing some funds so that overseas workers familiar with the area can assist the Wildlife and National Parks Department in their current efforts.

Further information can be obtained from the:
Director–General,
Department of Wildlife and National Parks,
K 20 Komplek Pejabat-Pejabat Kerajaan,
Jalan Duta,
Kuala Lumpur
MALAYSIA.

Siamang gibbon (Grzimek)

IUCN/SSC ASIAN ELEPHANT GROUP

NEWS NO 3

1. GENERAL

1.1. Educational audio/visual programme on the Asian elepant.

This programme, which was described in our first **News, Tigerpaper** IV: 4, p 25) when an appeal for photographic material for use in the programme was made, is now completed. The final presentation incorporates 40 colour transparencies, carefully selected from the many that were sent in. Robert Olivier, who researched and compiled the programme, would like to take this opportunity to thank all those who kindly contributed material in response to our appeal.

The programme, entitled "AVP 026/40 : The Asian Elephant" can now be ordered from the World Wildlife Fund Education Project, Brocklebank, Butts Lane, Woodmancote, Cheltenham, Gloucestershire GL 52 4QH, England, or from the Asian Elephant Secretariat (see section *6. Postcript* for address). In their basic form, audiovisual presentations produced by the World Wildlife Fund comprise a *35mm filmstrip* (FSD) and an illustrated *printed script.*

The filmstrip may be supplied cut and mounted into standard 35mm plastic slide mounts (SPM) or in special glass protected mounts (SGM). Of course filmstrips may also be cut and mounted into frames by the user.

A *pre–recorded commentary* (PRC) on international compact cassettes, is also available. Although these carry inaudible 'control' pulses allowing the programme to be operated on automatic slide–tape equipment, they may also be used on any standard cassette recorder. In this case the user changes the slide/filmstrip manually in accordance with the information in the illustrated or pulse–marked script.

When ordering please specify **exactly** the nature of the programmes you require using the codes indicated above.

The prices in U.S.$, including air postage and packing, for AVP 026/40 are FSD – $ 7.50; SPM – $ 15.00; SGM – $ 25.00; and the PRC – $ 6.00. Cheques should be made payable to **World Wildlife Fund** or **Asian Elephant Secretariat** according to where the order is placed. Small orders (less then US$ 25.00) should include an additional $ 1.50 to cover the cost of bank charges for cheque clearance. Thank–you!

It is hoped that this programme will in due course be translated from the original English into many other languages.

1.2 Synthetic Ivory

In order to better the long term survival prospects of both species of elephant, the S.S.C. Specialist Groups concerned consider it desirable that a synthetic ivory is developed. The production of a "new ivory", which could be given an attractive name such as "ivorine" is of obvious importance not only to the survival of elephant populations, but also to ivory carvers.

Marketing a high quality substitute should lower the price of real ivory and hence diminish killing of elephants. The company that manufactures it should make a good profit, especially in view of impending restrictions on ivory imports in Western Countries that are signatories to the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

It is also likely that demand for substitute ivory would increase as the wearing or possession of real ivory becomes shameful, as it is with spotted cat furs.

Furthermore the company to pioneer this "New Ivory" would benefit in public relations by its contribution to solving a burning conservation issue. Companies that come to mind are Dupont, Dow Chemicals and Hoffman la Roche. Finally such a substitute would allow ivory carvers in India, China, Hong Kong, and Africa to continue their livelihood without harming elephant populations.

If you have any ideas as to whom we could approach with a view to developing such a product, the Secretariat would be very grateful to hear of them.

1.3. W.W.F. Roll of Honour

Recently the Board of Trustees of the World Wildlife Fund (International) posthumously honoured ten distinguished conservationists by including them in the W.W.F. Roll of Honour. Amongst them is the late Patrick D. Stracey, a well known Indian Forester and Wildlife expert, and until his death, Head of the North–Eastern Task Force of this Group.

1.4. Meeting.

The 2nd Meeting of the entire SSC Asian Elephant Group will be held in 1978. Provisional dates and venue are late May and either Calcutta or Jamshedpur, India.

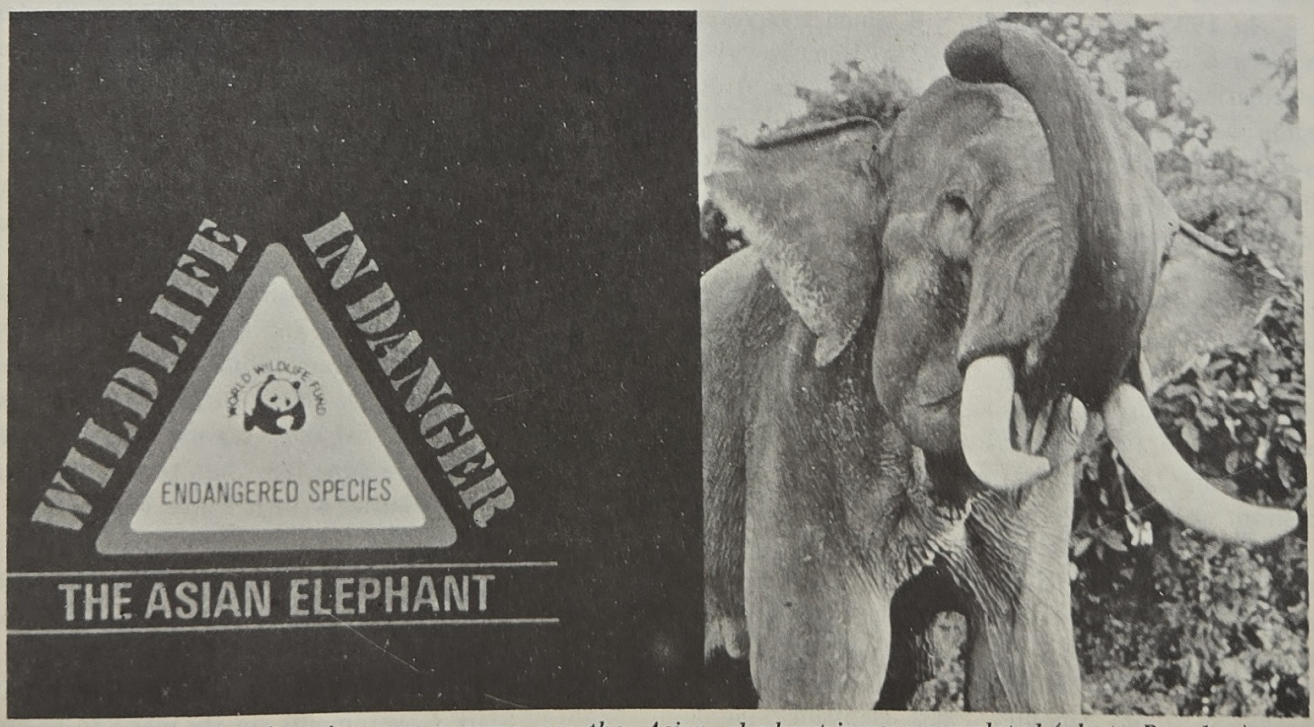
2. BANGLADESH

In a letter dated January 1978, M.K. Ranjitsinh writes that elephants in Bangladesh "are now confined to only two districts of the country in its southeastern corner – Chittagong and Hill Tracts. I had no time to carry out any personal investigation but just made a very hurried visit to some of the habitat and asked people during the course of my visit. The forests are very heavily disturbed except in one or two areas such as Kassalong and most of the forests are now reduced to small fragments and narrow strips. There is a young Japanese volunteer who is going from village to village asking the people of the number of elephants in their area. Though I did not meet him, the Division Forest Official of the area which he surveyed told me that he had arrived at the figure of 400. The D.F.O.'s own estimate was about 75, which I feel is also a bit of an over–estimate looking at the broken–up condition of the habitat and the extent of it. In such a situation the existing elephants have naturally to travel great distances from one remnant forest to another, and therefore are encountered by people of a large number of different villages in this very heavily populated area. In my opinion, a safe estimate of the elephant population in Bangladesh would be about 150, and could even be less. Not all of them are residents in the country, there being movement between neighbouring Indian and Burmese forests."

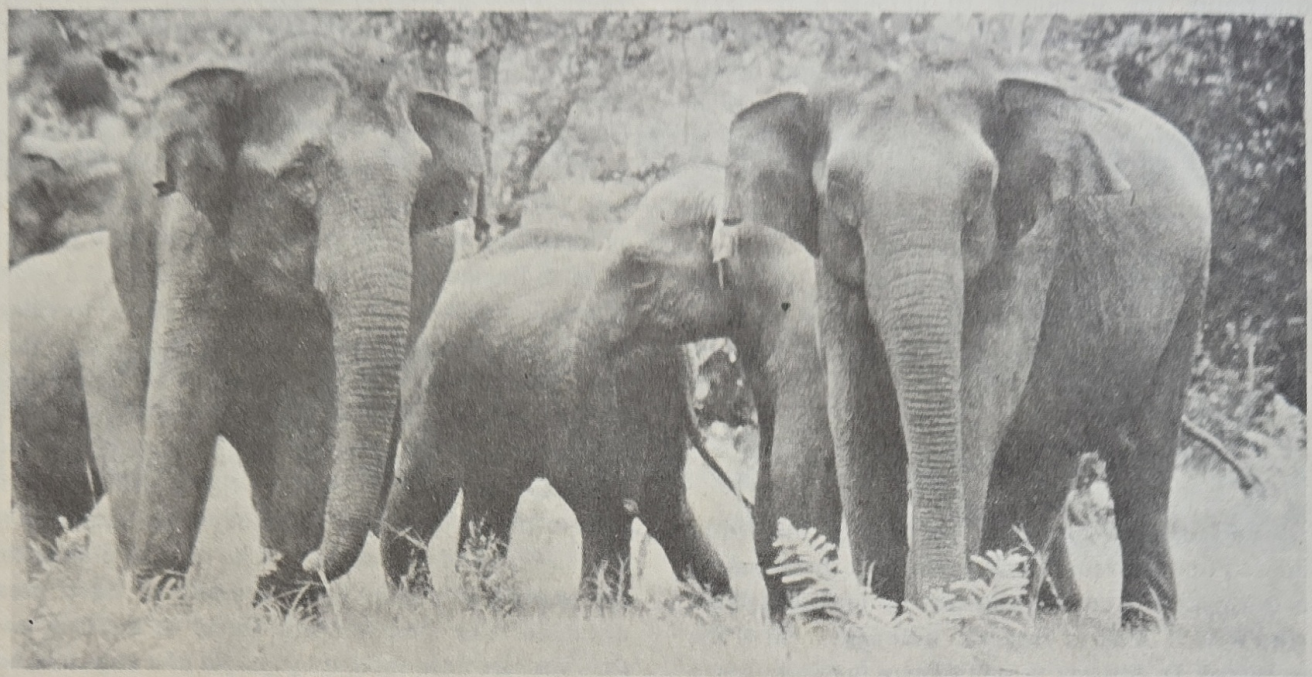
3. INDIA

3.1. New Members

Mr. S.R. Choudhury,
Field Director Project Tiger,
Simlipal Tiger Reserve,



Audio–visual education programme on the Asian elephant is now completed (photo Breeden)



Family unit in deciduous forest, India (photo E.H. Rao)

Baripada,
Orissa,
India.

Mr. R.M. Das, IFS (Retd),
45–A Kharghuli Hill,
Gauhati 781004,
Assam,
India.

3.2. Kumaon Task Force

In 1975 and 1976, Mr. V.B. Singh resurveyed the status of elephants in Uttar Pradesh. The first systematically organised census of elephants in the region was carried out in 1966 and 1967. In a paper to be published in the Journal of the Bombay Natural History Society, Mr. Singh describes how the population appears to have increased by nearly 130 animals over the last decade, with a maximum total of 507 elephants counted in 1976. Combined with a continued reduction in suitable habitat and other adverse factors, this increase has led to human/elephant conflicts. Pressure from various quarters to reduce their number threatened to recreate the 1964 climate of opinion, that led to orders from the State Government to shoot elephants over their entire range. As a result a general massacre of elephants followed in which 28 elephants were shot, and many more escaped wounded to die later on. With a view to avoiding a repetition of such a situation, it was decided to catch up to 25 elephants per year in an attempt to stabilise the population, and mollify anti–elephant public opinion.

Catching operations started in January 1977, and by the end of June, 18 elephant calves had been caught. A resumption of trapping operations is planned for the same season in 1978.

3.3. Southern Task Force.

a. Meeting.

The Southern Task Force held a businesslike and productive meeting on 15th and 16th January 1978 at the Mudumalai Wildlife Sanctuary, Tamil Nadu. The presence of the Forest Secretary, the Chief Conservator of Forests and the Chief Wildlife Warden of Karnataka, plus other senior officials from Kerala, Karnataka and Tamil Nadu gave weightage to the deliberations. Some visitors from other regions and other countries added further impact. A full report is not yet available, but the Co–ordinator, Mr. M.A. ParthaSarathy, has sent this preliminary summary of proceedings.

- The Survey report on elephants in Karnataka was very useful and interesting and it was decided that Kerala and Tamil Nadu would immediately produce surveys in their own States and that these reports should be available before June '78 when the next meeting of the Southern Task Force will be held in Kerala;
- The meeting endorsed the action taken by Mr. ParthaSarathy concerning investigations of the ivory trade and substitute ivory;
- A resolution drawing the attention of the State Governments on the need to become aware of the severe impact on elephant ha-

bitat by projects, and to take action to minimise it in the future was passed;

- The help sought by State Government Forest Departments in the matter of obtaining equipment and technology to immobilise and transport elephants where necessary and possible, is to be transmitted by the Asian Elephant Group to appropriate authority so that when areas are identified where such technique may be usefully employed, they may be able to do so;
- The assault on elephant populations as a result of poaching activities and expansion of agriculture needs corrective action, in the first instance to neutralise the current trend of negative publicity concerning the elephant, which is considered an enemy of man in many areas;
- Practical elephant protection and conservation measures such as trenches, elephant bridges and corridors are to be tried out by State Government Forest Departments to develop their cost/effectiveness and thus encourage more widespread implementation in the future;
- Once reports from the three southern States are received, the Task Force will evolve a project and management plan for elephants in the Southern region.

b. Nilgiris

Mr. E.R.C. Davidar, writing in the Nilgiri Wildlife Association's Centenary Souvenir (1877–1977), makes the following observations on the elephant in his article "Status of Wildlife in the Nilgiris". "In the writer's own experience of the past two decades, more elephants are met with in the district today than in the fifties. Some believe that this is deceptive and attribute the apparent increase to the shrinkage of the elephant's habitat by the denudation of forests all around, particularly in Kerala and some clearfelling in the district itself; especially, in the Nilgiri–Wynaad. Even if the population in the region as a whole has not increased, there are certainly more elephants in the district now than there were, say, fifty years ago. Elephants used to visit the plateau but rarely. Nowadays such visits are nothing unusual and there are a few permanent residents. Every year half a dozen or more people are killed in the district, but few of the elephants responsible are proscribed as 'rogues'. Only one of these has been shot in recent years, but some half a dozen or more elephants are found dead in the jungle each year, some from gunshot wounds".

3.4. Central and North–Eastern Task Force

a. Meeting.

On 9th November 1977 the Task Force had their first meeting at the Tata Centre, Calcutta. The purpose was to review progress made, and to plan and co–ordinate future activities. The Task Force proposed to complete work as soon as possible on a preliminary report for the overall elephant situation in West Bengal, Bihar, and Orissa, the groundwork for which was well in hand. The report would include estimates of funds required for detailed studies of elephant numbers and migration routes, which were

Aggregation of family unit on lake shore grasslands, Periyar Wildlife Sanctuary, S. India. (photo Breeden)

considered suitable components for a second phase to the survey in the region. It was noted that arrangements for preliminary surveying in the north and north–east, with the exception of North Bengal, had yet to be made.

A second meeting of the Force was planned for the first fortnight of January 1978. Reviews of some of the progress made in this region are given below.

b. Dalbhum Forest Division (Bihar)

Together with Mr.M.K. Sinha the Forest Officer, Dr. Lahiri Choudhury and Mr. Ashok Kumar have produced a report on a preliminary survey of the elephants in this area, whose existence has only become widely known since 1971. Studies since that date led to the creation in 1976 of the Dalma Hill Wildlife Sanctuary. Crop raiding Dalbhum elephants hit the headlines of the daily press in Calcutta in autumn of the same year, and did so again in 1977.

Surveying in this Division indicated three distinct populations with up to 70 animals in the Dalma Hill area, from 20–40 in the Ghatshila area, and a further 35 animals estimated in the Ruam and Musaboni forests south of the river Subarnrekha. Further studies were planned for the 1977/78 cool season.

c. An "Elephant Range" for Bihar/West Bengal?

Dr. Lahiri Choudhury has also reported on a preliminary survey of the status of elephants in Bankura Division of West Bengal, made in mid – November 1977. Elephants are only in the area between September and January, and appear to be part of the population found in the Dalma Hills (see above) during "summer". The Directorate of Forests, West Bengal, propose to combine all the areas used by elephants in Bankura and also Purulia and West Midnapore Divisions (West Bengal) into a South Bengal Sanctuary. As the area involved is contiguous with the already established Dalma Hill Sanctuary of Bihar, this proposal has the full support of the Asian Elephant Group, because the combined area would thus fulfill the concept of "Elephant Ranges" (see News No. 1 Tigerpaper IV: 4), in helping conserve the yearly range requirement of an elephant population. The furtherance of this approach is one of the Group's main aims. The proposed Sanctuary has enormous tourist potential due to its proximity to Calcutta, easy accessibility, and great scenic beauty.

d. Orissa

Perhaps the most exciting information to come from the Central Task Force is the news that Mr. Saroj Raj Choudhury feels that there may be as many as 2,000 elephants in Orissa. The Simlipal Tiger Reserve alone is expected to hold nearly 500, and the first proper census of elephants in the area is planned. Density figures so derived may then be applied to other Orissan elephant forests of similar nature, in order to make a more accurate estimate for the State. The Simlipal example emphasises the value of conserving animals with large range requirements such as tigers and elephants. The conservation of such animals automatically benefits many other species with equivalent or smaller range requirements.

4. NEPAL.

In November 1977 over 50 wild elephants crossed into Nepal over her far eastern border with India. The elephants caused considerable damage to rice fields, banana groves, and over 100 houses; two men were also killed. The Nepali authorities were forced to kill four elephants in an effort to drive them back to where they had come from; a move that apparently only won a temporary respite. This incident is recorded here as illustrative of the type of human/elephant conflicts that are noted with increasing regularity each year, throughout the existing range of the Asian elephant, and underline the need for conservation action *now*.

5. THAILAND.

The preliminary version of a comprehensive elephant conservation programme for Thailand, originating from this Group, has already won approval from the U.N. Asian Development Institute, which has included the project in its program for 1978–79. We hope that the final project, for which the Royal Thai Forest Department and National Environment Board have offered cooperation if project funds can be provided from outside sources, can be integrated within the National Conservation Plan currently being prepared by IUCN and UNEP. Hopefully these latter organisations, mindful of this support together with primary project facilities practically guaranteed by the Asian Development Institute, will in due course help implement this project from their own or other resources.

The sooner an elephant conservation programme is implemented, the better. Dr. Boonsong Lekagul, in a letter dated January 1978 writes: "Conditions for wild elephants are steadily worsening in Thailand. In the eastern region traditional migration routes to and from Cambodia have been permanently blocked by roads and agricultural developments.

Elephant populations in Khao Yai National Park and Khao Soi Daow Wildlife Sanctuary are confined to the forests remaining inside the reserve boundaries. In the West highways being built along the Burmese border will soon create another barrier to traditional migration routes in and out of Burma".

6. POSTSCRIPT

For further details of any topic covered in this News, please contact the IUCN/SSC/WWF Asian Elephant Secretariat, c/o Dept. Applied Biology, Pembroke Street, Cambridge CB2 3DX, England, or contact the Task Forces of Group Members concerned directly.

5–DAY SYMPOSIUM: THE ENVIRONMENT IN MALAYSIA

The Consumers' Association of Penang and the School of Biological Sciences, University Sains Malaysia are organizing a 5–day Symposium on the Environment in Malaysia to be held from 16–20 September 1978, in Penang. The aims are to assess;

i) the damage to the environment
ii) public awareness of the deterioration of the environment on the quality of life and
iii) to formulate a responsible plan for action in which all Malaysians can contribute to a higher quality of life.

The Symposium would welcome original/review papers with action proposals on the environment with special reference to Malaysia. Papers should be regulated to the following broad topics:

a) Aquatic and Terrestrial Resources and the Natural Habitat
b) Agriculture, Forestry and the Environment
c) Industrialization and the Environment
d) Conservation of the Environment and future prospects
e) Economic aspects and Legislation on the Environment

Intending authors are requested to submit the full titles of their papers and abstracts (not more than 200 words) before July 15, 1978. Write to:

Consumers' Association of Penang
21C, Codrington Avenue,
Pulau Penang, Malaysia
or
School of Biological Sciences
University Sains Malaysia
Penang, Malaysia

BAN ON MONKEY EXPORT

Bangladesh, once one of the world's leading suppliers of rhesus monkeys for research, has banned their export. It has also cancelled a decision taken earlier this year to export 5,000 of the animals to the US, a move which will cost Bangladesh $ 3 million in much–needed exchange.

Rhesus monkeys are used in polio vaccine research. Since about four animals die in capture and transit for every one that reaches the laboratory, the loss is far greater than it would otherwise have been. Welcoming the move, Mr. Cyril Rosen of the International Primate Protection League (IPPL) said: "There should be an animal prize equivalent to the Nobel Peace award, so that governments like Bangladesh, which respect their wildlife and take steps to preserve it, receive suitable recognition.

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BAITING AND PREDATION

In TIGERPAPER Vol IV, No 4, we published an article entitled "Success with the Branderi Barasinga" by H.S. Panwar of the Kanha National Park, India. Mr. Panwar stated that an increase in baiting frequency to lure tigers for tourist viewing in 1964 was a cause of a high predation rate on the barasinga at that time.

Mr. George B. Schaller, author of *The Deer and the Tiger,* who was conducting studies in Kanha at that time has written us to comment on the issue of baiting. During the period referred to by Mr. Panwar in his article, only 16 baits were tied out in 16 months and 7 of these 16 were used during the last month of the study. Mr. Schaller did not notice any increase of tigers in the area due to the baiting and states that the 8 tigers commonly seen in Kanha at that time included 5 cubs born to the resident tigresses.

Because tigers are a major tourist attraction and baiting may be the only means of making them readily visible to visitors in a park, the effects of such baiting on the local wildlife need to be studied carefully.

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